MATRIX VISION	Subject:	Hitachi KP-F100 BCL on mvTITAN-CL	Created	Last change
			18.07.03	18.07.03
Application Note	Project:	Camera adaption	Version 1.0	

Overview

Camera Hitachi KP-F100BCL

Running modes

Freerunning	[X]
Fixed shutter	[X]
ONE trigger	[X]
TWO trigger	[X]

Resolution

Horizontal	1392	pixel
Vertical	1040	pixel
Bits per Pixel	10	bpp
Binning	[ ]	
Partial Scan	[ ]	

Timings

Pixel clock	23	MHz
Horizontal	16	kHz
Vertical	15	fps

MATRIX VISION GmbH Frame Grabber

Typ	mvTITAN-CL					
Line Enable by	camera	[X]	Frame Grabber	[ ]	external	[ ]
Frame Enable by	camera	[X]	Frame Grabber	[ ]	external	[ ]
Trigger by	external	[X]	Frame Grabber	[X]		
Flash by	camera	[ ]	Frame Grabber	[ ]	external	[ ]

Software

MVacquireControl	[X]	
mvIMPACT Go!	[X]	
Other	[ ]	[e.g. LabView™, Halcon, etc.]

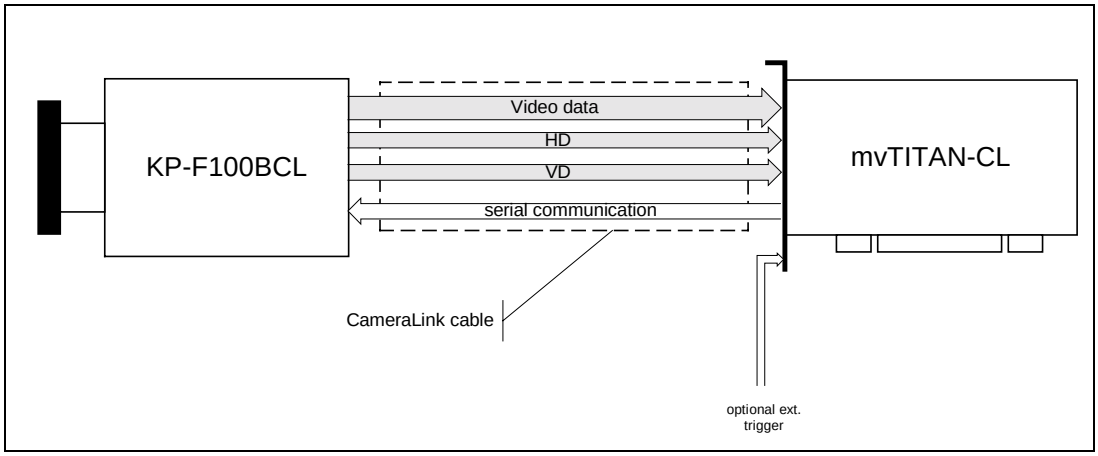
Imprint
MATRIX VISION GmbH
Talstraße 16
D-71570 Oppenweiler
Author: Thomas Wimmer

This document requires the general knowledge of the usage and the technical data of the used frame grabber, camera and application.
Information in this document is subject to change without notice and does not represent a commitment on the part of MATRIX VISION GmbH.
Email: info@matrix-vision.de.

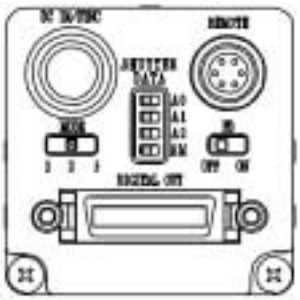
Freerunning Mode

The camera runs with its own timing and sends the data and all needed signals for synchronization to the mvTITAN-CL.

Signal map



Camera settings set by hardware



Dip-Switch *MODE* settings:

Position
1 or 2

Dip-Switch *FD* settings:

FD
OFF

Dip-Switch *SHUTTER* settings:

A0	A1	A2	RM
X	X	X	X

'ON': switched on, 'OFF': switched off, 'X': switch setting not relevant
Remark: The camera must be switched off and on to be sure it runs in the correct mode.

Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available.
So the settings must done on the backside of the camera. For this the remote switch (*RM*) must be set to *off*.

Pin connection (Camera Link™ base standard)

MDR 26 pin			MDR 26 pin	
Pin 1		inner Shield	Pin 26	
Pin 2		Tx Data 0-	Pin 25	
Pin 3		Tx Data 1-	Pin 24	
Pin 4		Tx Data 2-	Pin 23	
Pin 5		XCLK-	Pin 22	
Pin 6		Tx Data 3-	Pin 21	
Pin 7		SerTC+	Pin 20	
Pin 8		SerTFG-	Pin 19	
Pin 9		CC1-	Pin 18	

Pin 10		CC2+	Pin 17	
Pin 11		CC3-	Pin 16	
Pin 12		CC4+	Pin 15	
Pin 13		inner Shield	Pin 14	
Pin 14		inner Shield	Pin 13	
Pin 15		Tx Data 0+	Pin 12	
Pin 16		Tx Data 1+	Pin 11	
Pin 17		Tx Data 2+	Pin 10	
Pin 18		XCLK+	Pin 9	
Pin 19		Tx Data 3+	Pin 8	
Pin 20		SerTC-	Pin 7	
Pin 21		SerTFG+	Pin 6	
Pin 22		CC1+	Pin 5	
Pin 23		CC2-	Pin 4	
Pin 24		CC3+	Pin 3	
Pin 25		CC4-	Pin 2	
Pin 26		inner Shield	Pin 1	

Recommended cable for this mode from MATRIX VISION GmbH:
KSCL 03.0, length 3 meters
KSCL 05.0, length 5 meters
KSCL 10.0, length 10 meters

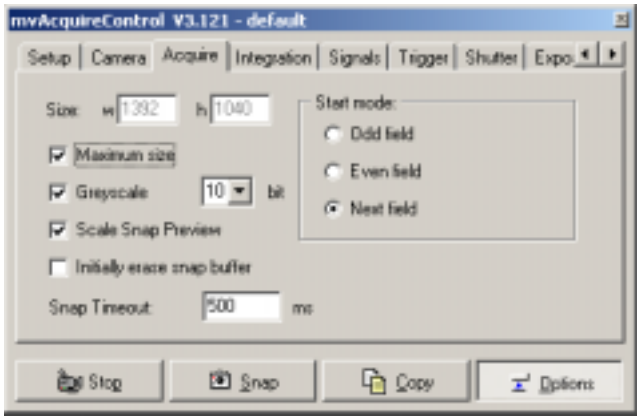
Cameradefinition

```
/*  ------------------------- KP-F100bcl -----------------------------------
DefCamType              "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup      "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam       "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit       "KP-F100bcl" PIXEL
DefVerticalUnit         "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire   "KP-F100bcl" 9L 1040L 1
DefCamClamp             "KP-F100bcl" 0L 0L
DefCamZero              "KP-F100bcl" 0L 0L
DefCamFieldGate         "KP-F100bcl" 0L 0L
```

Settings in MVacquireControl

In MVacquireControl you have to do at least the following settings:

- Choose the camera definition *KP-F100bcl* in tab *Camera*
- Activate Greyscale acquire in tab *Acquire*
- Set Greyscale acquire to 10bit



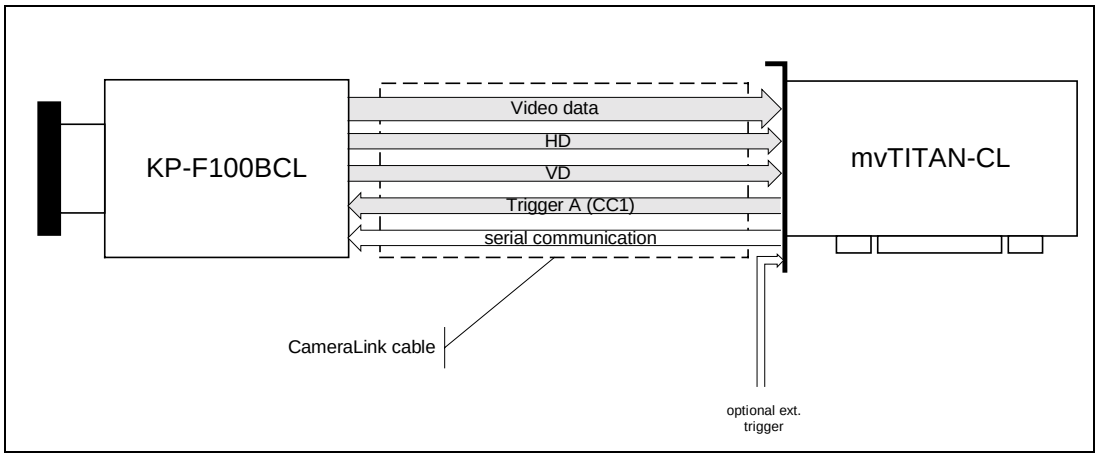
Settings in mvIMPACT Go!

Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.
For that open the *Options* dialog by the menu *Tools / Options*. Choose for Default bitshift for 16bit images the entry *2 (use for 10 bit images)*.
Now you are able to grab and show 10bpp greyscale images.

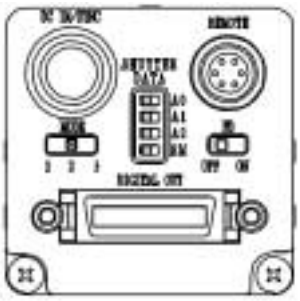
Fixed shutter mode (Restart/Reset)

The mvTITAN-CL sends a trigger signal to the camera. With this signal the camera is reset and integrates an images with a shutter time predefined in the camera.

Signal map



Camera settings set by hardware



Dip-Switch *MODE* settings:

Position
1

Dip-Switch *FD* settings:

FD
ON

Dip-Switch *SHUTTER* settings:

A0	A1	A2	RM
X	X	X	OFF

'ON': switched on, 'OFF': switched off, 'X': switch setting not relevant
The Switches A0 to A2 define the shutter time the camera uses each time the camera is reset by the trigger signal Trigger A.
Remark: The camera must be switched off and on to be sure it runs in the correct mode.

Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available.
So the settings must done on the backside of the camera. For this the remote switch (*RM*) must be set to *off*.

Pin connection (Camera Link™ base standard)

MDR 26 pin			MDR 26 pin	
Pin 1		inner Shield	Pin 26	
Pin 2		Tx Data 0-	Pin 25	
Pin 3		Tx Data 1-	Pin 24	
Pin 4		Tx Data 2-	Pin 23	
Pin 5		XCLK-	Pin 22	
Pin 6		Tx Data 3-	Pin 21	
Pin 7		SerTC+	Pin 20	

Pin 8		SerTFG-	Pin 19	
Pin 9		CC1-	Pin 18	
Pin 10		CC2+	Pin 17	
Pin 11		CC3-	Pin 16	
Pin 12		CC4+	Pin 15	
Pin 13		inner Shield	Pin 14	
Pin 14		inner Shield	Pin 13	
Pin 15		Tx Data 0+	Pin 12	
Pin 16		Tx Data 1+	Pin 11	
Pin 17		Tx Data 2+	Pin 10	
Pin 18		XCLK+	Pin 9	
Pin 19		Tx Data 3+	Pin 8	
Pin 20		SerTC-	Pin 7	
Pin 21		SerTFG+	Pin 6	
Pin 22		CC1+	Pin 5	
Pin 23		CC2-	Pin 4	
Pin 24		CC3+	Pin 3	
Pin 25		CC4-	Pin 2	
Pin 26		inner Shield	Pin 1	

Recommended cable for this mode from MATRIX VISION GmbH:
KSCL 03.0, length 3 meters
KSCL 05.0, length 5 meters
KSCL 10.0, length 10 meters

Cameradefinition

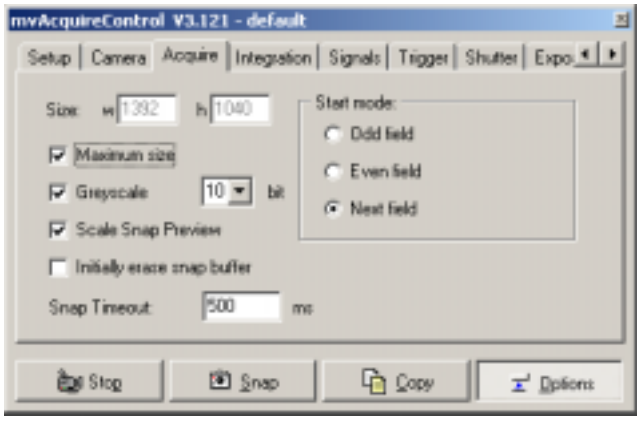
```
/*  ------------------------- KP-F100bcl -----------------------------------
DefCamType              "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup      "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam       "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit       "KP-F100bcl" PIXEL
DefVerticalUnit         "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire   "KP-F100bcl" 9L 1040L 1
DefCamClamp             "KP-F100bcl" 0L 0L
DefCamZero              "KP-F100bcl" 0L 0L
DefCamFieldGate         "KP-F100bcl" 0L 0L
```

Settings in MVacquireControl

Basic settings

In MVacquireControl you have to do at least the following settings:

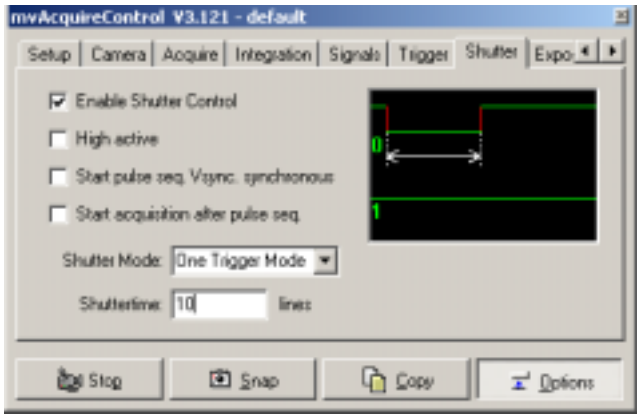
- Choose the camera definition *KP-F100bcl* in tab *Camera*
- Activate Greyscale acquire in tab *Acquire*
- Set Greyscale acquire to 10bit



Trigger settings

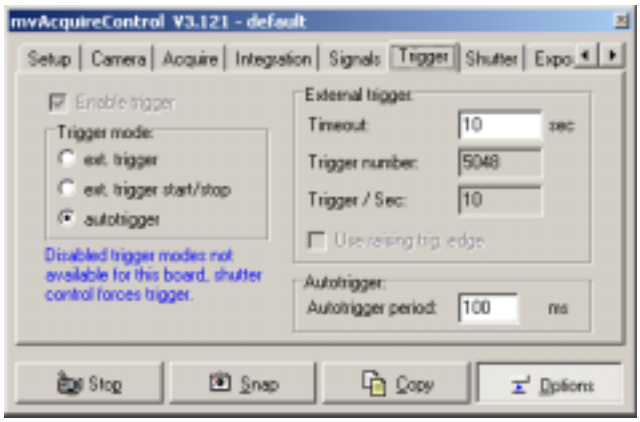
To activate the trigger output in MVacquireControl you have to do at least the following settings:

- Switch to register *Shutter*
- Enable checkbox *Enable Shutter Control*
- Disable *High active*
- Disable *Start pulse seq. Vsync. Synchronous*
- Choose *One Trigger Mode*



The *shuttertime* can be set to at least 1. The shuttertime doesn't influence the image acquisition in this mode.

In register *trigger* you will see that the *autotrigger* is automatically enabled. The output of the shutter control signal needs this trigger signal. You can either choose the autotrigger or the external trigger mode.



In **autotrigger mode** no external trigger signal must be connected to the mvTITAN-CL. The *Autotrigger period* defines the frequency of the internal generated trigger signal and so the frame rate you will get.

In **external trigger mode** the optional trigger signal must be connected to the mvTITAN-CL. You will find the description of this connector in the appendix of the mvTITAN-CL's manual. Each time an external trigger signal comes into the mvTITAN-CL the trigger signal is sent to the camera an image is acquired and is sent to the mvTITAN-CL.

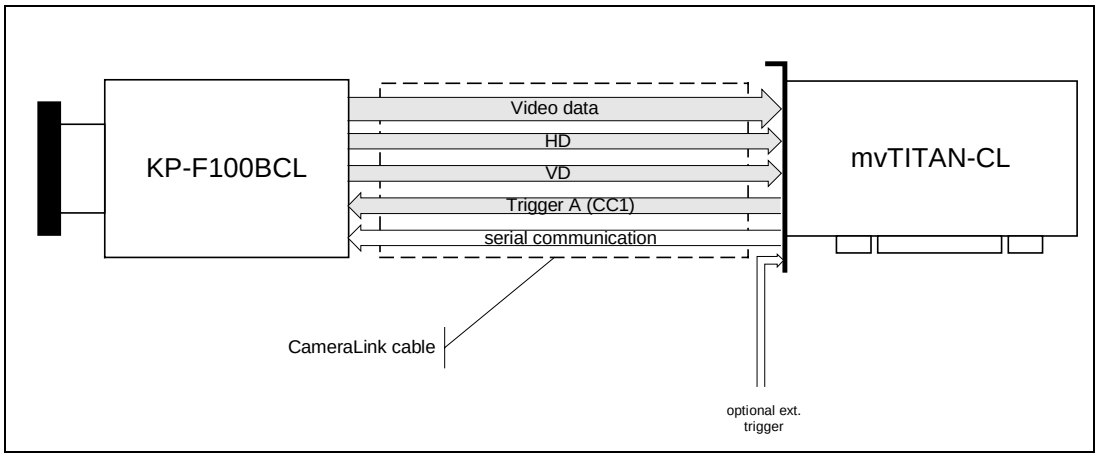
Settings in mvIMPACT Go!

Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.
For that open the *Options* dialog by the menu *Tools / Options*. Choose for Default bitshift for 16bit images the entry *2 (use for 10 bit images)*.
Now you are able to grab and show 10bpp greyscale images.

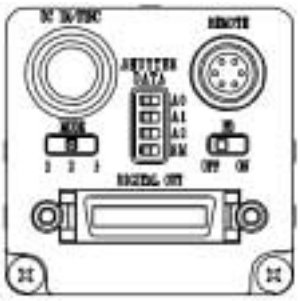
One trigger mode (pulse width control)

The mvTITAN-CL sends a trigger signal to the camera. With this signal the camera is reset and integrates images with a shutter time defined by the length of the trigger signal.

Signal map



Camera settings set by hardware



Dip-Switch *MODE* settings:

Position
3

Dip-Switch *FD* settings:

FD
ON

Dip-Switch *SHUTTER* settings:

A0	A1	A2	RM
X	X	X	OFF

'ON': switched on, 'OFF': switched off, 'X': switch setting not relevant
Remark: The camera must be switched off and on to be sure it runs in the correct mode.

Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available.
So the settings must done on the backside of the camera. For this the remote switch (*RM*) must be set to *off*.

Pin connection (Camera Link™ base standard)

MDR 26 pin			MDR 26 pin	
Pin 1		inner Shield	Pin 26	
Pin 2		Tx Data 0-	Pin 25	
Pin 3		Tx Data 1-	Pin 24	
Pin 4		Tx Data 2-	Pin 23	
Pin 5		XCLK-	Pin 22	
Pin 6		Tx Data 3-	Pin 21	
Pin 7		SerTC+	Pin 20	
Pin 8		SerTFG-	Pin 19	
Pin 9		CC1-	Pin 18	

Pin 10		CC2+	Pin 17	
Pin 11		CC3-	Pin 16	
Pin 12		CC4+	Pin 15	
Pin 13		inner Shield	Pin 14	
Pin 14		inner Shield	Pin 13	
Pin 15		Tx Data 0+	Pin 12	
Pin 16		Tx Data 1+	Pin 11	
Pin 17		Tx Data 2+	Pin 10	
Pin 18		XCLK+	Pin 9	
Pin 19		Tx Data 3+	Pin 8	
Pin 20		SerTC-	Pin 7	
Pin 21		SerTFG+	Pin 6	
Pin 22		CC1+	Pin 5	
Pin 23		CC2-	Pin 4	
Pin 24		CC3+	Pin 3	
Pin 25		CC4-	Pin 2	
Pin 26		inner Shield	Pin 1	

Recommended cable for this mode from MATRIX VISION GmbH:
KSCL 03.0, length 3 meters
KSCL 05.0, length 5 meters
KSCL 10.0, length 10 meters

Cameradefinition

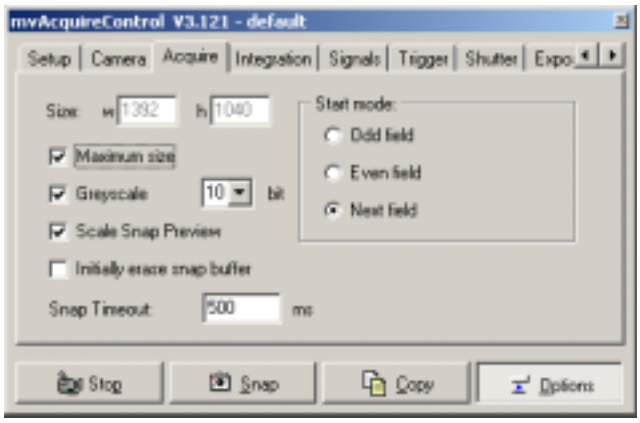
```
/*  ------------------------- KP-F100bcl -----------------------------------
DefCamType              "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup      "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam       "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit       "KP-F100bcl" PIXEL
DefVerticalUnit         "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire   "KP-F100bcl" 9L 1040L 1
DefCamClamp             "KP-F100bcl" 0L 0L
DefCamZero              "KP-F100bcl" 0L 0L
DefCamFieldGate         "KP-F100bcl" 0L 0L
```

Settings in MVacquireControl

Basic settings

In MVacquireControl you have to do at least the following settings:

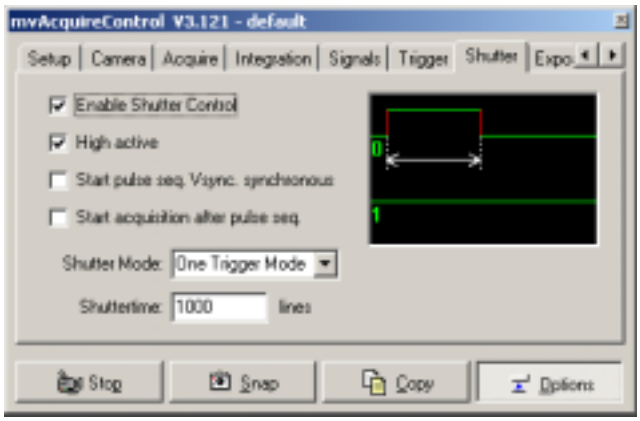
- Choose the camera definition *KP-F100bcl* in tab *Camera*
- Activate Greyscale acquire in tab *Acquire*
- Set Greyscale acquire to 10bit



Trigger settings

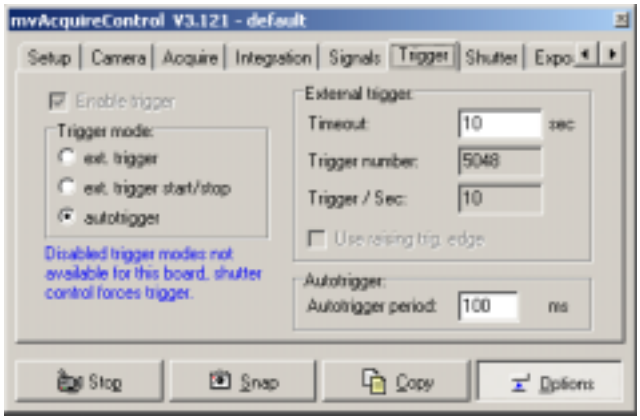
To activate the trigger output in MVacquireControl you have to do at least the following settings:

- Switch to register *Shutter*
- Enable checkbox *Enable Shutter Control*
- Enable *High active*
- Disable *Start pulse seq. Vsync. Synchronous*
- Choose *One Trigger Mode*



The value for *shuttertime* defines the puls length of the trigger signal (Trigger A) sent to the camera. In this mode the shuttertime defines the integration time used with each image acquisition in the camera.

In register *trigger* you will see that the *autotrigger* is automatically enabled. The output of the shutter control signal needs this trigger signal. You can either choose the autotrigger or the external trigger mode.



In **autotrigger mode** no external trigger signal must be connected to the mvTITAN-CL. The *Autotrigger period* defines the frequency of the internal generated trigger signal and so the frame rate you will get.

In **external trigger mode** the optional trigger signal must be connected to the mvTITAN-CL. You will find the description of this connector in the appendix of the mvTITAN-CL's manual. Each time an external trigger signal comes into the mvTITAN-CL the trigger signal is sent to the camera an image is acquired and is sent to the mvTITAN-CL.

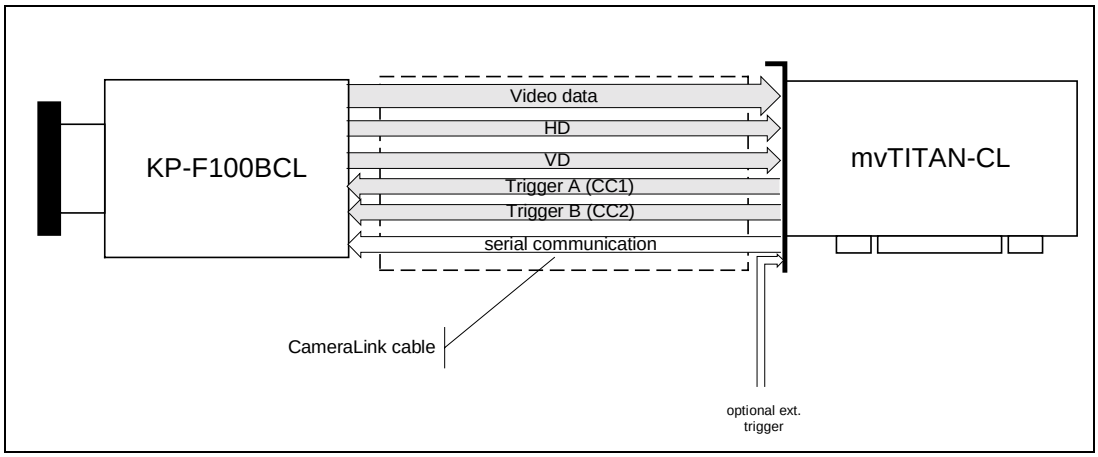
Settings in mvIMPACT Go!

Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.
For that open the *Options* dialog by the menu *Tools / Options*. Choose for Default bitshift for 16bit images the entry *2 (use for 10 bit images)*.
Now you are able to grab and show 10bpp greyscale images.

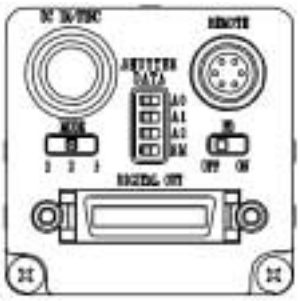
TWO trigger mode

The mvTITAN-CL sends two trigger signals to the camera. With this signals the camera is reset and integrates images with a shutter time defined by the time between these two triggers.

Signal map



Camera settings set by hardware



Dip-Switch *MODE* settings:

Position
2

Dip-Switch *FD* settings:

FD
ON

Dip-Switch *SHUTTER* settings:

A0	A1	A2	RM
X	X	X	OFF

'ON': switched on, 'OFF': switched off, 'X': switch setting not relevant
Remark: The camera must be switched off and on to be sure it runs in the correct mode.

Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available.
So the settings must done on the backside of the camera. For this the remote switch (*RM*) must be set to *off*.

Pin connection (Camera Link™ base standard)

MDR 26 pin			MDR 26 pin	
Pin 1		inner Shield	Pin 26	
Pin 2		Tx Data 0-	Pin 25	
Pin 3		Tx Data 1-	Pin 24	
Pin 4		Tx Data 2-	Pin 23	
Pin 5		XCLK-	Pin 22	
Pin 6		Tx Data 3-	Pin 21	
Pin 7		SerTC+	Pin 20	
Pin 8		SerTFG-	Pin 19	
Pin 9		CC1-	Pin 18	

Pin 10		CC2+	Pin 17	
Pin 11		CC3-	Pin 16	
Pin 12		CC4+	Pin 15	
Pin 13		inner Shield	Pin 14	
Pin 14		inner Shield	Pin 13	
Pin 15		Tx Data 0+	Pin 12	
Pin 16		Tx Data 1+	Pin 11	
Pin 17		Tx Data 2+	Pin 10	
Pin 18		XCLK+	Pin 9	
Pin 19		Tx Data 3+	Pin 8	
Pin 20		SerTC-	Pin 7	
Pin 21		SerTFG+	Pin 6	
Pin 22		CC1+	Pin 5	
Pin 23		CC2-	Pin 4	
Pin 24		CC3+	Pin 3	
Pin 25		CC4-	Pin 2	
Pin 26		inner Shield	Pin 1	

Recommended cable for this mode from MATRIX VISION GmbH:
KSCL 03.0, length 3 meters
KSCL 05.0, length 5 meters
KSCL 10.0, length 10 meters

Cameradefinition

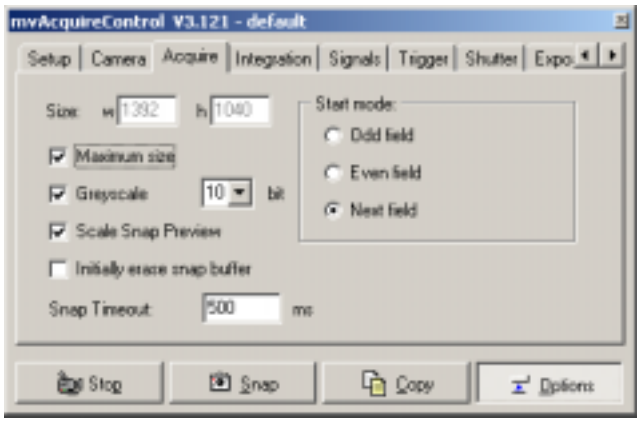
```
/*  ------------------------- KP-F100bcl -----------------------------------
DefCamType              "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup      "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam       "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit       "KP-F100bcl" PIXEL
DefVerticalUnit         "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire   "KP-F100bcl" 9L 1040L 1
DefCamClamp             "KP-F100bcl" 0L 0L
DefCamZero              "KP-F100bcl" 0L 0L
DefCamFieldGate         "KP-F100bcl" 0L 0L
```

Settings in MVacquireControl

Basic settings

In MVacquireControl you have to do at least the following settings:

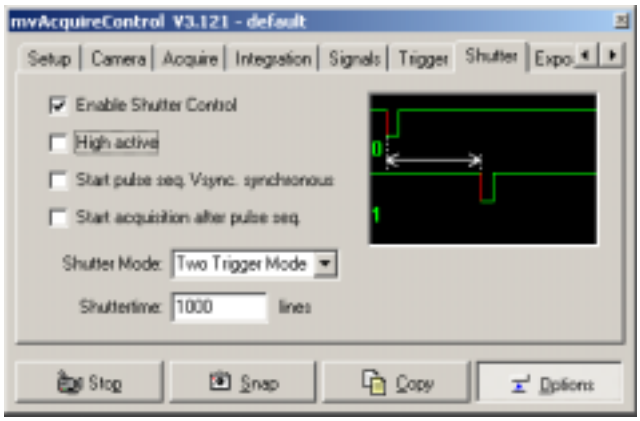
- Choose the camera definition *KP-F100bcl* in tab *Camera*
- Activate Greyscale acquire in tab *Acquire*
- Set Greyscale acquire to 10bit



Trigger settings

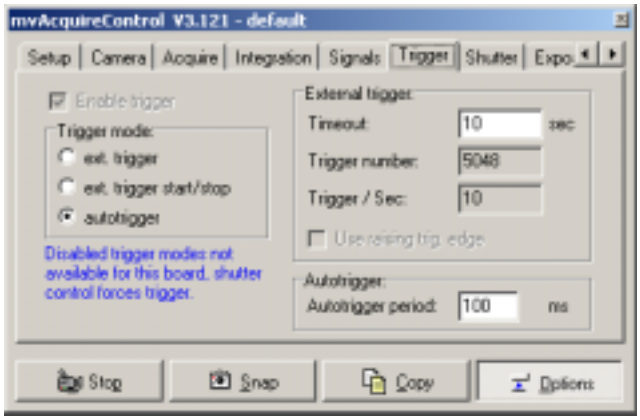
To activate the trigger output in MVacquireControl you have to do at least the following settings:

- Switch to register *Shutter*
- Enable checkbox *Enable Shutter Control*
- Disable *High active*
- Disable *Start pulse seq. Vsync. Synchronous*
- Choose *Two Trigger Mode*



The value for *shuttertime* defines the time between the pulse 1 (Trigger A) and pulse 2 (Trigger B). In this mode the shuttertime defines the integration time used with each image acquisition in the camera.

In register *trigger* you will see that the *autotrigger* is automatically enabled. The output of the shutter control signal needs this trigger signal. You can either choose the autotrigger or the external trigger mode.



In **autotrigger mode** no external trigger signal must be connected to the mvTITAN-CL. The *Autotrigger period* defines the frequency of the internal generated trigger signal and so the frame rate you will get.

In **external trigger mode** the optional trigger signal must be connected to the mvTITAN-CL. You will find the description of this connector in the appendix of the mvTITAN-CL's manual. Each time an external trigger signal comes into the mvTITAN-CL the trigger signal is sent to the camera an image is acquired and is sent to the mvTITAN-CL.

Settings in mvIMPACT Go!

Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.
For that open the *Options* dialog by the menu *Tools / Options*. Choose for Default bitshift for 16bit images the entry *2 (use for 10 bit images)*.
Now you are able to grab and show 10bpp greyscale images.

Remarks

More about the frame grabber you will find in the mvTITAN-CL's manual which comes with the supplied mvIMPACT CD-ROM.
If you want to know more about the settings and behavior of MVacquireControl and mvIMPACT Go! please take a look at the manuals which are automatically copied to your system with the program's installation.

Glossary

Expression	Explanation
VD	Vertical drive, signal is sent to signalize next field (noninterlaced) or frame (interlaced). Also called Frame Enable, VSync or frame start signal.
HD	Horizontal drive, signal is sent to signalize next line. Also called Line Enable, HSync or line start signal.